IN THE CLAIMS:

1. (previously presented) An X-ray fluorescence film thickness measuring device comprising:

an X-ray generating system having a high-voltage power source and an X-ray tube for irradiating primary X-rays;

focusing means for focusing primary X-rays irradiated from the X-ray generating system onto microscopic measurement regions in a sample using a slit unit, a collimator, or a capillary unit utilizing a total reflection phenomenon;

a sample observation optical system for observing the sample during focusing of the primary X-rays for use in positioning of the microscopic measurement regions relative to the primary X-rays;

a system having a liquid nitrogen-less PIN diode X-ray detector or a silicon drift chamber used as a first sensor with low counting efficiency but high energy resolution for detecting X-ray fluorescence generated from the sample, and a proportional counter, CdZnTe detector, or a scintillation counter as a second sensor having low energy resolution but high counting efficiency compared to the first sensor, the first and second sensors being arranged side-by-side in a sample chamber that is open to the atmosphere and not evacuated, and the system being divided between the first

and second sensors according to energy of X-ray fluorescence by utilizing the first sensor for X-ray fluorescence from low energy and utilizing the second sensor for X-ray fluorescence from high energy;

a pair of pre-amplifiers each for receiving a signal from a respective one of the first and second sensors;

a pair of linear amplifiers each for receiving a signal from a respective one of the pre-amplifiers;

a pair of frequency analyzers each for analyzing a frequency signal from a respective one of the linear amplifiers; and

common control and computing sections for quantitatively processing signals from the frequency analyzers.

2. (previously presented) An X-ray fluorescence film thickness measuring device comprising:

an X-ray generating system having a high-voltage power source and an X-ray tube for irradiating primary X-rays;

focusing means for focusing primary X-rays irradiated from the X-ray generating system onto microscopic measurement regions in a sample using a slit unit, a collimator, or a capillary unit utilizing a total reflection phenomenon;

a sample observation optical system for observing the sample during focusing of the primary X-rays for use in

positioning of the microscopic measurement regions relative to the primary X-rays;

a system having a liquid nitrogen-less PIN diode X-ray detector or a silicon drift chamber used as a first sensor with low counting efficiency but high energy resolution for detecting X-ray fluorescence generated from the sample, and a proportional counter, CdZnTe detector, or a scintillation counter as a second sensor having low energy resolution but high counting efficiency compared to the first sensor, the first and second sensors being arranged side-by-side in a sample chamber that is open to the atmosphere and not evacuated, and the system being divided between the first and second sensors according to energy of X-ray fluorescence by utilizing the first sensor for X-ray fluorescence from low energy and utilizing the second sensor for X-ray fluorescence from high energy;

a pair of pre-amplifiers each for amplifying a signal from respective ones of the first and second sensors;

a single digital circuit for amplifying and analyzing frequencies of signals from the pre-amplifiers; and

common control and computing sections for quantitatively processing signals from the single digital circuit.

3. (currently amended) A fluorescent X-ray film thickness measuring device comprising:

an X-ray generating system having a high-voltage power source and an X-ray tube for generating and emitting primary X-rays;

focusing means including a first collimator block for focusing the primary X-rays onto microscopic measurement regions in a sample and a second collimator block disposed above the first collimator block for receiving primary X-rays from the X-ray generating system and ~~irradiating~~ focusing the primary X-rays toward the first collimator block;

a sample observation optical system for observing the sample during focusing of the primary X-rays for use in positioning of the microscopic measurement regions relative to the primary X-rays;

a detector for detecting X-ray fluorescence generated from the sample;

a pre-amplifier for amplifying a signal from the detector;

a linear amplifier for amplifying a signal from the pre-amplifier; and

a frequency analyzer for analyzing a frequency of a signal from the linear amplifier.

4. (previously presented) A fluorescent X-ray film thickness measuring device according to claim 3; wherein the first collimator block comprises a half mirror section and a collimator section located at a side surface of the half mirror section, and the second collimator block comprises a plurality of collimator units located in order along a lateral direction, the first collimator block and the second collimator block being movable in a direction generally perpendicular to an optical axis of the primary X-rays; and further comprising an arbitrary collimator section or half mirror section disposed at a position along an optical axis of the first and second collimator blocks.

5. (previously presented) An X-ray fluorescence film thickness measuring device comprising:

an X-ray generating system for generating and irradiating primary X-rays;

focusing means for focusing primary X-rays irradiated from the X-ray generating system onto microscopic measurement regions in a sample;

a sample observation optical system for observing the sample during focusing of the primary X-rays for use in positioning of the microscopic measurement regions relative to the primary X-rays;

a first sensor with low counting efficiency but high energy resolution for detecting X-ray fluorescence generated from the sample;

a second sensor having low energy resolution but high counting efficiency compared to the first sensor; and

a pair of pre-amplifiers each for receiving a signal from a respective one of the first and second sensors.

6. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the focusing means comprises a slit unit.

7. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the focusing means comprises a collimator.

8. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the focusing means comprises a capillary unit utilizing a total reflection phenomenon.

9. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the first sensor comprises a liquid nitrogen-less PIN diode X-ray detector.

10. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the first sensor comprises a silicon drift chamber.

11. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the second sensor comprises a proportional counter.

12. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the second sensor comprises a CdZnTe detector.

13. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the second sensor comprises a scintillation counter.

14. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the first and second sensors are arranged side-by-side in a sample chamber that is open to the atmosphere and not evacuated.

15. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; further comprising a pair of linear amplifiers each for amplifying a signal from a respective one of the pre-amplifiers; and a pair of frequency analyzers each for analyzing a frequency of the signal from a respective one of the linear amplifiers.

16. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 15; further comprising common control and computing sections for quantitatively processing signals from the frequency analyzers.

17. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; further comprising a digital circuit for amplifying and analyzing frequencies of signals from the pre-amplifiers.

18. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; further comprising common control and computing sections for quantitatively processing signals from the single digital circuit.

19. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 5; wherein the focusing means comprises a first collimator block for focusing the primary X-rays onto the microscopic measurement regions and a second collimator block disposed above the first collimator block for receiving primary X-rays from the X-ray generating system and irradiating the primary X-rays toward the first collimator block.

20. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 19; wherein the first collimator block comprises a half mirror section and a collimator section disposed at a side surface of the half mirror section; and wherein the second collimator block comprises a plurality of collimator units, the first collimator block and the second collimator block being movable in a direction generally perpendicular to an optical axis of the primary X-rays.

21. (previously presented) An X-ray fluorescence film thickness measuring device according to claim 20; further comprising another collimator section or half mirror section disposed at a position along an optical axis of the first and second collimator blocks.

22. (currently amended) A fluorescent X-ray film thickness measuring device comprising:

an X-ray generating system for generating and emitting primary X-rays;

a first collimator block for focusing the primary X-rays onto microscopic measurement regions in a sample;

a second collimator block disposed above the first collimator block for receiving primary X-rays from the X-ray generating system and ~~irradiating~~ focusing the primary X-rays toward the first collimator block;

a sample observation optical system for observing the sample during focusing of the primary X-rays for use in positioning of the microscopic measurement regions relative to the primary X-rays;

a detector for detecting X-ray fluorescence generated from the sample;

a pre-amplifier for amplifying a signal from the detector;

a linear amplifier for amplifying a signal from the pre-amplifier; and

a frequency analyzer for analyzing a frequency of a signal from the linear amplifier.

23. (previously presented) A fluorescent X-ray film thickness measuring device according to claim 22; wherein the first collimator block comprises a half mirror section and a collimator section disposed at a side surface of the half mirror section.

24. (previously presented) A fluorescent X-ray film thickness measuring device according to claim 23; wherein the second collimator block comprises a plurality of collimator units.

25. (previously presented) A fluorescent X-ray film thickness measuring device according to claim 24; further comprising another collimator section or half mirror section disposed at a position along an optical axis of the first and second collimator blocks.

26. (previously presented) A fluorescent X-ray film thickness measuring device according to claim 22; wherein the detector comprises a first sensor with low counting efficiency but high energy resolution for detecting X-ray fluorescence generated from the sample and a second sensor having low energy resolution but high counting efficiency compared to the first sensor.